National Aeronautics and Space Administration

LAGNIAPPE

Volume 22 Issue 1 | John C. Stennis Space Center | January 26, 1999

The first hot fire test of the Fastrac engine was held last month. The Fastrac engine, the second engine developed in the U.S. in the past 26 years, will power the new, unpiloted X-34 technology demonstrator. The test was the first hot firing on the B-2 stand since 1981.

Fastrac testing begins at Stennis Space Center

The first hot fire test series on Fastrac engine number 1 occurred on the B-2 test stand Friday, Dec. 11, 1998. With the engine in a horizontal test position, the first hot firing/ ignition test was successfully conducted for 2.43 seconds.

The December test marked the beginning of a new propulsion test program at Stennis. It was the first hot firing on the B-2 test stand since the Shuttle Main Propulsion Test Article completed its ground test program in January 1981.

Richard King, NASA's project manager for the Low Cost Technologies Project at Stennis, said all conditions were nominal. A second short-duration hot fire test was conducted January 7 to further develop the start and stop transients and prepare for running the engine at its rated power level of 60,000 pounds thrust in the very near future.

The Fastrac was developed at Marshall Space Flight Center in Huntsville, Ala. It is fueled by a mixture of kerosene and liquid oxygen and uses a gas generator to drive a single-shaft turbopump.

Upon completion of development and flight certification tests this year, the Fastrac engine will power the new, unpiloted X-34 technology demonstrator. The center's role in testing the new engine for the X-34 is part of the Low Cost Technologies project, a joint effort between Marshall and Stennis.

Through the program, NASA'a aim is to dramatically lower the cost of launching small payloads, up to 500 pounds, into low-Earth orbit. Low cost access to space is considered a key to scientific progress and commercial economic development of space.

The Fastrac engine is installed horizontally on the outer edge of the test stand's eleventh level. During the test, the engine's exhaust plume extends outward rather than vertically into the water-cooled flame deflector.

Each Fastrac engine will initially cost about $1.2 million. Once the engine is in serial production, the cost is expected to drop to about $750,000.

Development time for a new rocket engine has traditionally taken as long as 10 years, but the Fastrac was developed in 2 1/2 years.

See FASTRAC, Page 10

NASA technology used to find oil seeps

Through the Commercial Remote Sensing Program at Stennis Space Center, NASA has joined with industry to demonstrate practical applications of space technologies in America's marketplace.

One such partnership is between the Earth Observation Commercial Applications Program (EOCAP) at Stennis and the Earth Satellite Corporation (EarthSat), of Rockville, Md., a company that is using remote sensing technology to help identify natural marine oil seeps in the Gulf of Mexico.

Remote sensing uses sensors mounted on aircraft or satellites to look at the Earth's surface. Information gathered by these sensors can be used to make detailed maps of specific areas around the planet. These maps have many uses, such as roadway planning, disaster assessment, or as in the case of EarthSat, they can be used to help identify marine oil seeps.

Oil migrates naturally through cracks from deposits deep below the ocean floor, releasing oil into the world's surface waters. These marine oil seeps offer clues as to where oil deposits may be located in ocean basins. Marine oil seeps occur naturally and are manifested as oil slicks on the ocean's surface.

"Oil seep detection is a market that has not been addressed by any other EOCAP partnerships," said Mark Mick, NASA's EOCAP manager at Stennis. "I also think it is a good application for remote sensing technology."

EOCAP is a NASA/industry partnership that uses remote sensing and related technologies to explore markets for NASA Earth sciences-related products that will enhance opportunities for industry customers. Such partnerships can last up to two years.

These NASA/industry partnerships help promote the use of products based on remote sensing technologies in markets where such technologies are underutilized or are not used at all. NASA's technical and financial participation helps reduce the market risk associated with new product development to a level that partnering companies can accept. This allows small companies to explore

See OIL, Page 10

LAGNIAPPE Commentary

Gator looks to the 21st century

I unfurled my favorite calendar for the new year, the west Florida one with the colorful historical pictures. I get one of these calendars each year, but this one seemed a little strange. I remember thinking that the 1999 date is unsettling. Just think, this time next year we will be writing 2000 on our checks, and this century will be coming to an end.

As I began entering standing appointments into my new calendar, I got to thinking about all of the marvelous things that humankind had accomplished during the 20th century—not to mention NASA's contributions during the last forty years.

About that same time, Gator appeared at my door and shouted at the top of his gravelly voice, "Happy New Year, Mr. Historian!"

It was good to see the old boy. After all, we have collaborated for over a quarter of a century on Gator's exploits here at Stennis Space Center.

"Well, Gator, happy New Year to you. I was just sitting here thinking about the past century and wondering what lies ahead for us in the new millennium."

"Pretty heavy stuff to ponder this early in the year," Gator replied. "For one thing, it's safe to assume that the Saints won't be going to the Super Bowl in the next century!"

"Now, now, now, Gator, you never know what could happen," I admonished. "Seriously though, when looking back over the last one-hundred years, what do you think were our most important accomplishments of the 20th century?"

"Well, I don't know. Maybe the development of the airplane, or going to the Moon. What about computers and the Internet?"

"All of that's good," I said. "I personally believe medical science's advancements should be noted, like heart surgery and organ transplants."

"I would like to add television. We would have a hard time seeing the Braves games if the tube had not been invented."

"Gator, the things you think up are amazing. Now, get out your crystal ball and guess at what will be in store for us in the new millennium."

"Well, hoss, that's a good question. I reckon we'll see lots of things that we can't even imagine. Like voyages to Mars, building a colony, even a city on the Moon. There'll be hotels in space and people and their families will be living and working on space stations that orbit the Earth. And here on Earth, we'll be traveling from coast-to-coast in a matter of minutes."

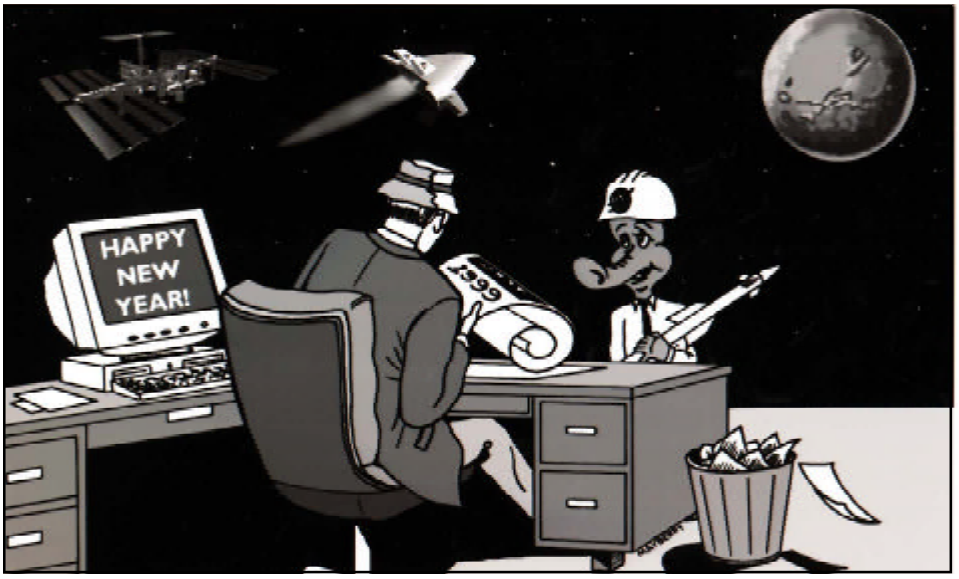
"That sounds like a pretty good description of the 'big picture' Gator. But, what do you think will be going on right here at Stennis Space Center?"

"Our great-great grandchildren will be testing warp-speed engines and studying data from satellites from all over the universe. Why, I'll even bet our personnel will be going TDY on the Moon and Mars! Who knows, maybe we can get ourselves placed in suspended animation and wake up like futuristic Rip Van Winkles and see for ourselves."

"Gator, I hope you're right, I'd like to be around to see all your predictions come true."

"We better quit dreaming and get to work," Gator said. "We still have lots to do this year!"

M.R.H.



NASA NEWSCLIPS

NASA selects 125 innovative small business projects—NASA has selected 125 research proposals for negotiation of Phase II contract awards for NASA's Small Business Innovation Research (SBIR) Program. The selected projects, which have a total value of approximately $73 million, will be conducted by 113 small, high technology firms located in 26 states.

The goals of this NASA program are to stimulate technological innovation, increase the use of small business (including women-owned and disadvantaged firms) in meeting federal research and development needs, and increase private sector commercialization of results of federally funded research.

A total of 312 proposals were submitted by SBIR contractors completing Phase I projects.

Stennis received four awards: American GNC Corp of Chatsworth, Calif., for a hyperspectral imagery exploitation tool using evolutionary computing methods for remote sensing applications; Mainstream Engineering Corp. of Rockledge, Fla., for a propellant leak detection system; Northeast Photosciences of Hollis, N.H., for an emission tomography for non-intrusive three-dimensional measurements of density, temperature and chemical comp-osition in rocket engine plumes; and Pacific Island Technology Inc of Honolulu, for a reflection and thermal band hyperspectral imager.

Phase II continues development of the most promising Phase I projects. Selection criteria include technical merit and innovation, Phase I results, value to NASA, commercial potential and company capabilities.

Hubble software helps on Earth too—Computer software developed for NASA's Hubble Space Telescope will soon help operate a worldwide, satellite-based phone system called Globalstar. This software is a key feature of NASA Goddard Space Flight Center's "Vision 2000," an effort to optimize the ground system operations and control of the Hubble Space Telescope.

The "Vision 2000" software allows scientists and engineers to access and display Hubble spacecraft- and ground-systems data through the Internet. Now, engineers can log on from home or other remote locations via their computers.

This Hubble spinoff will provide the company Globalstar, LP in San Jose, Calif., with the technology to aid in delivering voice, data, fax and other telecommunications services to users worldwide. The spinoff will satisfy the critical need for Globalstar engineers to remotely access spacecraft telemetry data from anywhere in the world. Globalstar will be able to coordinate efforts, and dynamically monitor and troubleshoot situations with the constellation of 48 satellites from multiple locations.

International Space Station construction moving right along

In a historic moment, Mission Commander Robert Cabana and Russian Cosmonaut/Mission Specialist Sergei Krikalev swung open the hatch between the Endeavour and the first element of the International Space Station at 1:15 p.m. CST, Thursday, Dec. 10, 1998.

The STS-88 astronauts completed the first steps in the orbital construction of the International Space Station. In all, it took Jerry Ross and James Newman three space walks totalling 21 hours and 22 minutes to complete the initial assembly of the station.

International Space Station flight controllers at Mission Control in Houston and at the Russian Mission Control Center in Korolev, outside Moscow, will now spend the next five months monitoring the station's systems and awaiting the launch of Discovery during mission STS-96, scheduled for May. STS-96 will see a multinational crew of seven astronauts return to the station in a logistics resupply flight, which will include at least one spacewalk to attach hardware to the new orbiting facility.

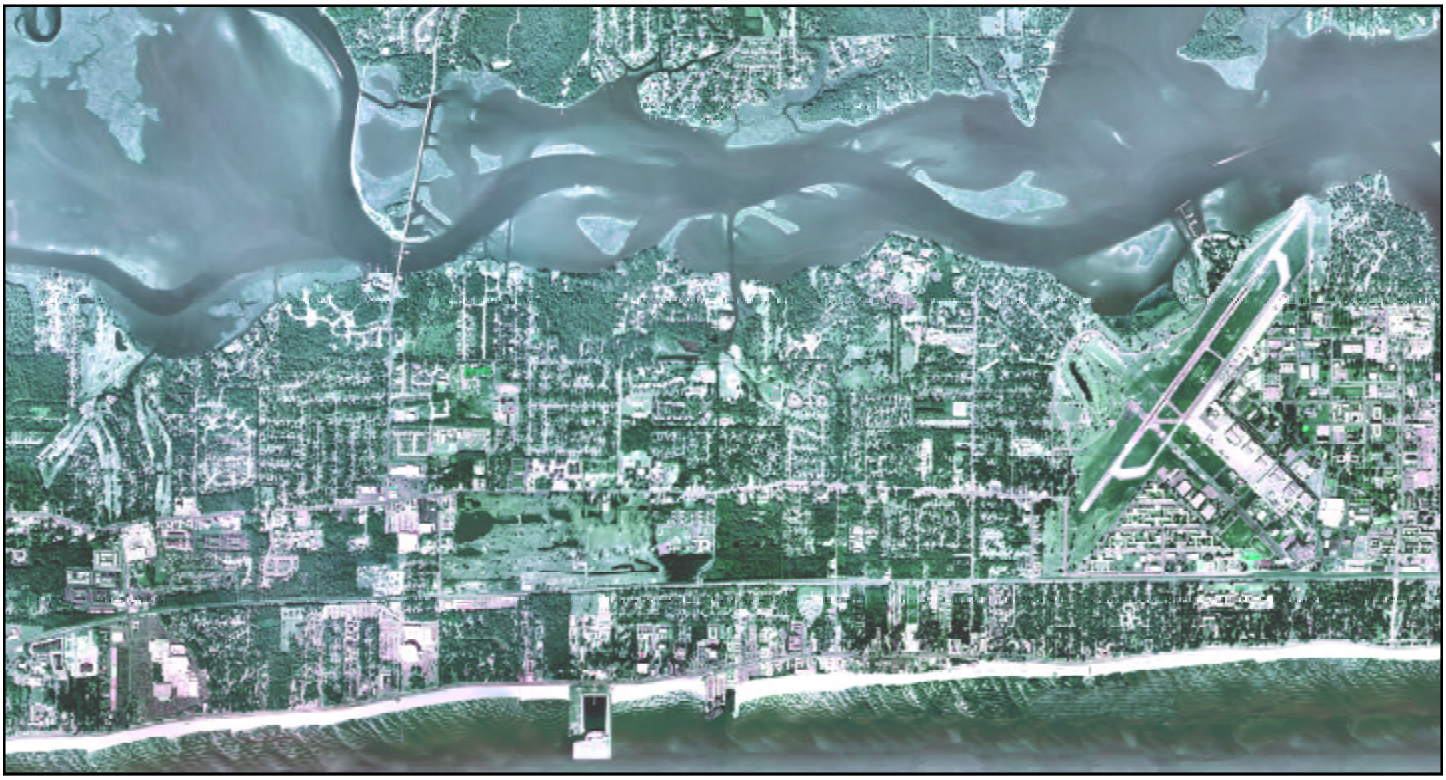
The Space Shuttle and two types of Russian rockets will conduct 45 missions to launch and assemble the more than 100 elements which will comprise the completed International Space Station. In all, 460 tons of structures, modules, equipment and supplies will be placed in orbit by the year 2004.

Recently, the centerpiece of the International Space Station arrived at Kenndy Space Center and is being processed for launch.

The U.S. Laboratory module, called Destiny, was built by the Boeing Co. at Marshall Space Flight Center in Huntsville, Ala., and is slated for launch Feb. 3, 2000 during STS-98.

The International Space Station continues the largest scientific cooperative program in history, drawing on the resources and scientific expertise of 16 nations.

Astronauts Jerry Ross (left) and James Newman, both mission specialists, work together on the final of three space walks of the STS-88 mission. One of the solar panels of the Russian-built Zarya module runs through the frame.



This image of Biloxi, on the Mississippi Gulf Coast, is representative of data purchased through the $50 million Scientific Data Buy that the Commercial Remote Sensing Program at Stennis manages for NASA. The NASA Scientific Data Buy is a pilot program for a new way of doing business—procuring data from commercial sources as a more efficient use of taxpayer funds by government agencies. The image was compiled from one meter data purchased from Positive Systems Inc. An ADAR 5500 multispectral digital camera system was flown in a light aircraft at 7,000 feet in November 1998 to gather the information.

Gen. John Dailey, acting NASA deputy administrator, held a Town Hall Meeting for NASA Program and Project Managers at Stennis Space Center Dec. 15, 1998. The objective of the meeting was to familiarize employees involved in programs and projects with the new NASA Program/Project Management Process and how they will fit into that process. Pictured from left are Stennis Space Center Deputy Director Mark Craig, Deputy Associate Administrator of the NASA Office of Space Flight R.J. Wisniewski, Stennis Space Center Director Roy Estess, Dailey, NASA Chief Engineer Daniel Mulville and Dr. Ed Hoffman, program manager, program and project management.

Space station, ice on Moon just some of NASA's finds in 1998

Aeronautics and space got noticed in '98 — with the return of John Glenn to Earth orbit, the start of International Space Station construction and the discovery of ice on the Moon.

Background information is available to illustrate the top 10 NASA stories of the year via the World Wide Web at the URLs listed.

Glenn returns to space

Sen. John Glenn was named as a payload specialist last Jan. 16 and assigned to the crew of the Space Shuttle Discovery, which was launched Oct. 29, 1998, on a nine-day mission.

http://www.jsc.nasa.gov/Bios/htmlbios/glenn-j.html

First International Space Station assembly begins

Phase II — construction in orbit — began with the first station elements launched in 1998: Zarya in November and Unity in December. Next, the first wholly Russian contribution, a component called the Service Module, will be launched from Russia in 1999.

http://spaceflight.nasa.gov/

Hubble takes image of possible planet

NASA's Hubble Space Telescope gave astronomers their first direct look at what is possibly a planet outside our solar system — one that apparently has been ejected into deep space by its parent stars.

http://oposite.stsci.edu/1998/19

Most powerful gamma ray burst since Big Bang

A cosmic gamma ray burst detected last year released a hundred times more energy than previously theorized, making it the most powerful explosion since the creation of the universe in the Big Bang.

http://science.msfc.nasa.gov/newhome/headlines/ast06may98_1.htm

Lunar Prospector discovers ice on Moon

There is a high probability that water ice exists at both the north and south poles of the Moon, according to initial scientific data returned by NASA's Lunar Prospector last year.

ftp://ftp.hq.nasa.gov/pub/pao/pressrel/1998/98-038.txt

NASA studies La Nina

Research scientists using data from the Tropical Rainfall Measuring Mission, SeaWiFS and TOPEX/POSEIDON missions are shedding new light on the phenomenon known as La Nina. The images show changes in sea-surface temperature and ocean current movement and the dissipation of El Nino. While it is still early, the results to date appear to confirm the onset of La Nina-type conditions.

http://topex-www.jpl.nasa.gov/discover/el_nino.html

Antarctic ozone hole

In late 1997, larger levels of ozone depletion were observed over the Antarctic than in any previous year on record. In 1998, using climate models, a team of scientists reported why this may be related to greenhouse gases.

ftp://ftp.hq.nasa.gov/pub/pao/pressrel/1998/98-058.txt

Magnetar

A neutron star, located 40,000 light years from Earth, is generating the most intense magnetic field yet observed in the Universe, according to an international team of astronomers.

http://science.msfc.nasa.gov/newhome/headlines/ast20may98_1.htm

Pathfinder airplane

NASA's remotely piloted, solar-powered Pathfinder-Plus flying wing reached a record altitude of more than 80,000 feet during a developmental test flight August 6 in Hawaii. The altitude is the highest ever achieved by a propeller-driven craft and surpasses the official record altitude of 71,530 feet for a solar-powered aircraft set by an earlier version of the Pathfinder last summer.

http://www.dfrc.nasa.gov/PAO/PressReleases/1998/98-64.html

Collins named first woman commander

First Lady Hillary Rodham Clinton announced in early 1998 that astronaut Eileen Collins would become the first woman to command a Space Shuttle when Columbia launches on the STS-93 mission in April 1999.

http://www.jsc.nasa.gov/Bios/htmlbios/collins.html

Staff members of several congressional offices representing Mississippi, Louisiana and Alabama visited Monday, Jan. 11 to receive an overview of NASA missions at Stennis by Director Roy Estess. The group also received briefings on Navy activities at Stennis by Rear Adm. Kenneth Barbor and viewed a test firing of a Space Shuttle Main Engine. The following day, they toured NASA's Michoud Assembly Facility in New Orleans. The group also included representatives from appropriations and authorization committees with NASA oversight, as well as representatives from the office of Louisiana Governor Mike Foster and other State of Louisiana offices.

Offices work to transfer technology to the public

NASA's Earth System Science Office and Technology Transfer Office at Stennis Space Center have announced the signing of a Space Act Agreement with Surveys Unlimited Research Associates Inc. (SURA), of Baton Rouge, La., to share remote sensing techniques and technology that improve the accuracy of archaeological site surveys.

Remote sensing is the ability to observe the surface of the Earth from sensors mounted on aircraft or satellites. Information gathered by the sensors is made into images of the surveyed area. The images can be used to produce very accurate and detailed maps of the Earth's surface. The maps can be applied to many areas of everyday life such as emergency planning, crop irrigation and fertilization scheduling, commercial development siting, or as in the partnership with SURA, for use in developing more accurate archaeological surveys.

SURA provides consulting services to private, state and federal organizations on issues related to the management of cultural resources and historic preservation.

"NASA's remote sensing technology and applications, including digital imagery and ground penetrating radar, provide survey companies the needed data to rapidly discover archaeological features, determine their extent and locate areas that require further testing," said NASA's Marco Giardino, a research scientist with the Earth System Science Office at Stennis. "We are eager to collaborate with SURA to test a variety of remote sensing techniques that will improve our joint capability to locate and preserve important archaeological resources."

The surveys will be used to locate and map buried

See TECHNOLOGY, Page 9

Technicians from ICI Contractors unload the Thrust Measurement System on the south tarmac behind the B-1 test stand.

B-1 modifications continue as personnel prepare for RS-68 test

A major element of the modified B-1 test stand arrived at Stennis on Friday, Jan. 8. The Thrust Measurement System (TMS) will form the mounting surface for the RS-68 Engine in the test stand.

The TMS was built by Integrated Aero Systems, Costa Mesa, Calif., for the Boeing Co.'s Rocketdyne Division. The TMS will be installed in B-1 by NASA-Stennis construction contractors as part of the B-1 modifications. The new TMS is required because the existing Space Shuttle Main Engine TMS could not handle the RS-68 thrust loads.

The Space Shuttle Main Engine produces approximatley 418,000 pounds of thrust at sea level, while the RS-68 produces approximately 650,000 pounds of thrust at sea level.

See RS-68, Page 10

Taylor continues the tradition of excellence at Stennis

SSC Employee Profile

As NASA's lead center for rocket propulsion testing, Stennis Space Center has a role in the forefront of the space program. Engines for a new generation of space exploration vehicles are being tested at Stennis or at one of three other test sites managed by Stennis Space Center.

The RS-68 engine is one of the newest rocket engines produced in the United States in 25 years. Jim Taylor Jr., will be managing the RS-68 test project at Stennis Space Center.

As NASA's RS-68 project manager with the Propulsion Test Directorate at Stennis, Taylor is responsible for coordinating the activities of the many different organizations involved in this new test program.

"This is the first large engine development program that has been undertaken since the Space Shuttle Main Engine," Taylor said. "We're very excited here at Stennis to be a part of that."

Developed by the Boeing Co., the RS-68 will be assembled in the deactivated Mississippi Army Ammunition Plant located at Stennis and tested on the nearby stands that were used to test fire the first and second stages of the Saturn V for the Apollo program, as well as the main engines for the Space Shuttle. Modification of the B-1 test stand is in the final stages, and testing is expected to begin in June 1999.

The engine will provide propulsion for Boeing's new Delta IV expendable launch vehicle. Testing of the first stage of the Delta IV, known as the common booster core, will also be conducted at Stennis.

"I think Stennis has a fantastic team of people that are really committed to make this center go."

Jim Taylor Jr.

"This is the first time that Stennis has been tapped by a commercial company for a major project like that," Taylor said. "That, in and of itself, is a reinforcement of what we're trying to do as a center of excellence for rocket propulsion testing. That is, we're not only recognized within the government as a center of excellence, but also by private industry."

In 1984, Taylor earned a bachelor's degree in civil engineering from Mississippi State University and worked for civil engineering consulting firms in Jackson, Miss., and Memphis, Tenn. He first came to Stennis Space Center in 1988 as a project engineer working for Pan Am World Services on the design of various building projects in support of the Space Shuttle Main Engine test activities.

From there, Taylor went to work for NASA on other jobs, each with increasing responsibility, at such places as Marshall Space Flight Center in Huntsville, Ala., and NASA Headquarters in Washington, D.C. He worked for three years at the Pratt and Whitney Resident Office in West Palm Beach, Fla., where he was NASA's resident engineering representative responsible for the design and production of advanced turbomachinery for the Space Shuttle Main Engine.

Taylor returned to Stennis in November 1996 as a test and project engineer for the Space Shuttle Main Engine testing program.

In December 1997, Taylor was promoted to his present position.

When he's not at Stennis overseeing the testing of a new generation of rocket engines, Taylor can be found at home in Pearl River, La., with his wife Lori. He and his wife are active members of Aldersgate United Methodist Church in Slidell.

At Stennis, Taylor believes he is working with a great group of people with whom he enjoys interacting. "I think Stennis has a fantastic team of people that are really committed to make this center go," he said.

Working on the new RS-68 testing project, Taylor and his colleagues have a sense of what their Saturn V and Space Shuttle Main Engine testing counterparts experienced during the infancy of those programs.

"It's real exciting, a lot of people are looking forward to it," Taylor said.

Stennis Space Center prepares for February ISO 9001 audit

Representatives from third-party registrar, Det Norske Veritas (DNV), will return to Stennis February 9-12 to conduct an on-site registration audit as part of Stennis Space Center's continuing ISO 9001 certification efforts.

Mark Craig, Stennis deputy director and chairman of the steering committee said, "Our NASA and contractor team has worked hard to prepare for this audit. ISO certification is critically important to the future of Stennis because its common sense philosophy of 'say it, do it, prove it' is increasingly an expectation of our customers. The day is not far off when being ISO-certified will be required to win work. ISO isn't a flash in the pan; it's the way we're going to work from now on."

The preassessment audit held last June provided good insight into what the team can expect during the February registration audit. The findings raised during the preassessment have been addressed and resolved through the ongoing corrective action process.

Preparation for the audit has focused on the content of written procedures, and emphasis has been placed on identifying processes; making sure that written procedures and actual practices match; eliminating obsolete procedures; and developing new written procedures where none existed.

ISO certification is a tangible statement of Stennis' long-standing commitment to delivering quality products and services to our customers. That commitment is stated at the highest level in our Stennis Customer Service manual and flows down into our System Level Procedures and Work Instructions. Up-to-date versions of these documents, as well as information on ISO, are available in the ISO section of the Stennis internal homepage at **www6.ssc.nasa.gov/iso9000**.

Chancellor visits to review strides made in remote sensing

NASA's Education and University Affairs office at Stennis Space Center recently hosted Dr. Wallace Conerly, vice chancellor of the University of Mississippi Medical Center. Conerly visited Stennis, NASA's lead center for commercial remote sensing, to see firsthand the strides being made in the industry.

Remote sensing is the ability to observe the surface of the Earth from sensors mounted on aircraft or satellites. The Commercial Remote Sensing Program (CRSP) at Stennis has established Workforce Development Eduction and Training (WDET) to ensure that Mississippi will have a trained work force that will be available to populate the remote sensing industry.

Currently, University of Mississippi Medical Center is one of five WDET centers of excellence for geospatial studies for students seeking remote sensing related degrees.

Also, the medical center has been designated as the medical imaging center in NASA's technology application plan. In this capacity, it is working to develop uses for remote sensing in the medical imaging field.

Dr. Wallace Conerly, vice chancellor of the University of Mississippi Medical Center, visited Stennis Space Center recently to see firsthand the strides being made in the field of remote sensing. Pictured from left: Dr. David Powe, chief of NASA Education and University Affairs at Stennis; Conerly; Roy Estess, director of Stennis Space Center; and Mark Craig, deputy director of Stennis Space Center.

This would allow the manipulation of body images to allow physicians to see the image in three dimensions. Additionally, the remote sensing of vital signs is also under consideration. Heart rate, pulse, blood pressure and temperature would be available in split seconds after a sensor is aimed at the patient.

While at Stennis, Conerly received briefings from the CRSP office, NASA's Technology Transfer Office, the Mississippi Space Commerce Initiative and the Naval Oceanographic Office.

STENNIS EDUCATOR RESOURCE CENTER

Spring 1999 Workshops

Estimation & Measurement Olympics
January 29, Teachers grades 2-5

Down in the Deep Blue Sea
February 3, Teachers grades K-3

Home Page Development
February 4, Teachers grades K-12

Turned on to Computers
February 9, Teachers grades K-12

Is it Science or is it Magic
February 10, Teachers grades 2-6

Five Themes of Geography
February 10, Teachers grades 7-12

Introduction to Windows '95
February 10, Teachers grades 7-12

Introduction to Internet
February 23, Teachers grades K-6; March 9, Teachers grades 7-12

GLOBE
February 24,25 & 26; April 21,22 & 23
All teachers

Picture Yourself as a Scientist
March 3, Teachers grades 2-6

Introduction to Word
March 4, All teachers

Take a Look at Me
March 4, Teachers grades K-4

Introduction to Power Point
March 4; April 14, All teachers

It's Only Art
March 17; March 19, Teachers grades K-6

Making Algebra Relevant and Fun
March 17, Teachers of Algebra 1

Language Arts and the Internet
April 13, Teachers grades K-6

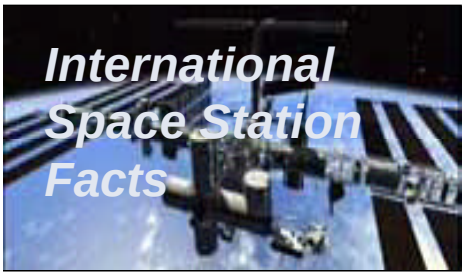
Make Mine Math
April 14; April 16 Teachers grades K-6

Making Biology Relevant and Fun
April 15, Teachers of Biology 1

This Land is My Land
April 28, Teachers grades K-4

All workshops begin at 8:30 a.m. The workshops are offered at Stennis Space Center at no charge. Reservations are required due to limited seating. For reservations, call the NASA Educator Resource Center at 1-800-237-1821 (select option 2) or (228) 688-3338 between the hours of 7 a.m. and 3 p.m. Monday through Friday.

The center has been accepted as a sponsor for Continuing Education Units. For more information, contact the Educator Resource Center at the number listed above.



Medicine—The Space Station will provide a unique environment for research on the growth of protein crystals, which aid in determining the structure and function of proteins. Such information will greatly enhance drug design and research in the treatment of diseases. Crystals already grown on the Space Shuttle for research into cancer, diabetes, emphysema, parasitic infections and immune system disorders are far superior to crystals grown on Earth.

Software Development—Research on large space vehicles will lead to improved computer software for developing new, lightweight structures, such as antennae and solar collectors, with precision pointing accuracy. Such developments will greatly benefit the communications, utility and transportation industries.

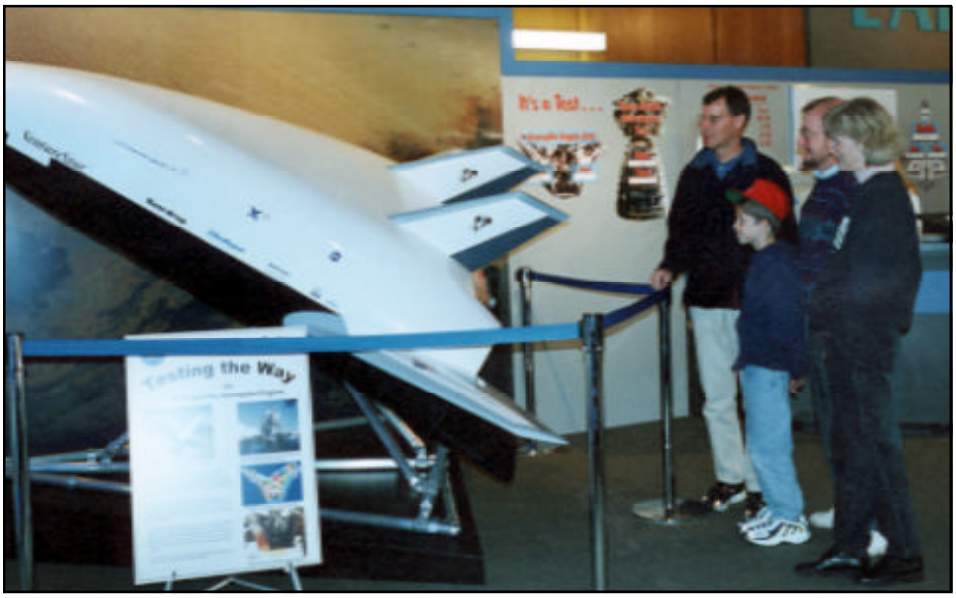
Polymer Development—Space Station facilities with the near absence of gravity will permit researchers to study materials that could not exist and processes that could not take place in full-Earth gravity. These materials include polymers for everything from paint to contact lenses; semiconductors for high-speed computers and electronics; high-temperature superconductors for efficiency in electrical devices; and ultrapure crystals for medical use.

Industrial Processes—Experimental research in the near absence of gravity produces new insights into industrial processes in materials that cannot be replicated on Earth, including increased understanding of fluid physics and combustion. Space Shuttle experiments to study metal alloy solidification in space could lead to taking lighter, stronger superalloys. A better understanding of the combustion process can lead to energy conservation on Earth. A two percent increase in burner efficiency for heaters would save the United States $8 billion per year.

The 10th Annual Dr. Martin Luther King Jr. Birthday Observance Program was held January 14 in the Visitors Center auditorium. Dr. Felix James, history professor at Southern University in New Orleans, served as guest speaker for the celebration. Master of Ceremonies was Eric Labat with NAVOCEANO. The theme of the program was "Remember! Celebrate! Act! A Day on, Not a Day Off." It was sponsored by the Stennis Space Center Association for Cultural Awareness and NAVOCEANO. Pictured from left is James; Association for Cultural Awareness President Denise Dedeaux; and Evelyn Johnson, NASA's Acting Equal Employment Opportunity Officer at Stennis.

The C-SPAN traveling school bus stopped at Stennis Space Center in January to tape an interview with NASA's Boyce Mix, director, Propulsion Test Directorate. The interview will be part of a video vignette about Stennis and its history of testing large rocket propulsion systems for America's space program. The bus, one of two crisscrossing the country, is a mobile production studio that travels the country stopping at area schools to educate students and teachers about C-SPAN networks and how to use their programming as a tool to critically view public affairs and the government in action. The Stennis vignette will air in about two months.

A true-to-life Martian terrain now exists at the Visitors Center. Twenty-three truckloads of bauxite were delivered recently to enhance the landscape of the "1 Main Street, Mars" exhibit. This was made possible through the cooperative efforts of the Defense Logistics Agency, Baton Rouge, La., the Naval Construction Battalion Center (Seabee Center) in Gulfport, Miss., and NASA.



From left, Chris and Jordan Schafer of San Diego, Bruce Schafer of Aloha, Ore., and Jill Schafer of San Diego, get an up-close look at a scale model of the X-33. The Schafers were recognized as the last visitors of 1998 to Stennis Space Center. Their visit boosted the center's year-end visitor count to more than 113,000, which is more than the 1997 total of 112,087. This annual figure is comprised of people representing all 50 states and numerous countries from around the world. The X-33 is a prototype for NASA's reusable launch vehicle system. The engines for the X-33 will be tested at Stennis. Major enhancements to the Visitors Center at Stennis are planned to open this summer. For more information, call 1-800-237-1821 (select option 1) in Mississippi and Louisiana or (228) 688-2370.

TECHNOLOGY...

(continued from Page 5)

archeological deposits such as historic or prehistoric house floors, graves and hearths. Sites that contain these indicators may be of some historic value and would be places where future development is undesirable.

Applying remote sensing techniques to archaeology is important to NASA and Stennis Space Center's Earth System Science Office. Locating archaeological sites and determining their extent can be beneficial in modeling climate change and sea level rise, both research interests of NASA's Earth Science Enterprise.

Since the partnership involves the transfer of technology, which includes the teaching of specialized techniques, the Technology Transfer Office at Stennis joined with the Earth System Science Office to assist in the project.

"The Technology Transfer Office is excited about this new endeavor," said Kristen Riley, intellectual property manager in NASA's Technology Transfer Office. "Our mission is to transfer NASA-developed technology to the commercial sector. Applying remote sensing technology to the field of archaeology will greatly enhance the capabilities of companies such as SURA and improve their efficiency. NASA will work with SURA to transfer the technology to them and provide appropriate training on how to use the technology."

The Louisiana Technology Transfer Office at Louisiana State University, also in Baton Rouge, will work with SURA to assist in the commercial development of the remote sensing techniques learned from Stennis personnel.

The partnership works in two directions: SURA will be taught how to apply remote sensing to its line of work, and NASA will receive information to ground verify airborne remote sensing data. NASA will be able to utilize field surveys conducted by SURA to calibrate and verify remotely sensed data as it applies to archaeological site location and assessment.

"These techniques will be of interest to state and federal land managers who need to assess the historical value of large areas of public land under their administrative control," said Giardino.

Safety Corner

Information provided by NASA's Safety Reliability and Quality Assurance Office

Safety takes teamwork

We have test teams, design teams and contractor teams, all working toward common goals. Often these goals are to meet schedule and cost. Safety is communicated as being a priority but can become a victim of the pressures of schedule and cost.

To prevent this from happening, project managers and team leaders must set high standards and be examples of how those standards are maintained. Integrity and commitment to safety starts at the top. Lack of perceived commitment or involvement on the part of management can derail efforts to effectively integrate safety into the team. Members need to know that management is committed and connected to the safety process and to meeting safety goals.

Leading by example is the best way to communicate what safety level management wants to achieve. Leading by example reinforces what is expected from individuals and teams.

Team based safety fits well within the NASA team culture. NASA and its contractor teams traditionally have promoted an environment where all team members can become actively involved in the improvement of the safety process.

Remember the goal – "Zero injuries, illnesses and incidents."

QUICK LOOK

■ **The American Institute of Aeronautics and Astronautics (AIAA)** will hold a dinner meeting Thursday, Jan. 28 at Doug's Restaurant on Robert Blvd., Slidell, La., with featured speaker Dr. Ken Cox. A 30-year NASA veteran, Cox is currently assistant to the Director, Engineering Directorate at Johnson Space Center. His presentation is titled, "A Futurist Perspective on Space" and is part of the AIAA's Distinguished Lecturers Program. Stennis personnel are invited. Reservation deadline is Tuesday, Jan. 26. For more information, call Ext. 7207.

■ **The SSC Security Office reminds employees that it maintains a lost-and-found box**. If you have lost or found an item, call the security dispatcher at Ext. 3636.

FASTRAC...

(continued from Page 1)

Other engineers working on the Fastrac include: Dr. Don Chenevert, lead project engineer for the Low Cost Technologies project; John Stealey, B-2 test director; and Barry Robinson, the test conductor.

RS-68...

(continued from Page 5)

Jim Taylor Jr., RS-68 project manager at Stennis Space Center said, "This represents a significant milestone in the modification of the B-1 and, ultimately, the initiation of RS-68 testing here at Stennis Space

OIL...

(continued from Page 1)

the use of remote sensing without exposure to excessive financial risk.

To detect oil seeps, EarthSat uses radar satellite data from RadarSat International, a joint NASA-Canadian Space Agency mission in Richmond, British Columbia, Canada, and at times from radar data of the European Space Agency and the U.S. Landsat Thematic Mapper. The radar data measures changes in the texture of the ocean surface, which differs noticeably if an oil slick is present. The very thin oil layer on the water dampens the little (capillary) waves, making the radar image appear dark. Oil companies may use this information to identify areas with potential hydrocarbon deposits and plan their seismic exploratory activities.

The advantage to companies of EarthSat's spaceborne radar survey technique is that it is less expensive than aerial surveys, and it allows oil companies to concentrate their explorations in areas that are most likely to be oil-rich. A satellite survey of an area of the ocean costs tens of thousands of dollars, while a typical seismic survey has a price tag of hundreds of millions of dollars. "If you find oil seeping out of the ocean floor, it makes the decision to spend millions of dollars on a seismic survey much easier," said Roger Mitchell, vice president of EarthSat.

As a result of its partnership with NASA, EarthSat and its industry partner, RadarSat International, were recently awarded the prestigious 1998 Canadian-American Business Achievement Award. The award was created in 1994 to recognize and promote the positive contribution that innovative business alliances between the United States and Canada can produce.

LAGNIAPPE

Lagniappe is published monthly by the John C. Stennis Space Center. Roy Estess is the center director, and Myron Webb is the public affairs officer. Lanee Cooksey is the news chief. Comments and suggestions should be forwarded to the Lagniappe Office, Building 1200, Room 208, Stennis Space Center, MS 39529, or call (228)688-3583.

EDITOR:.....Sharon Saucier
CONTRIBUTING WRITERS:
Robert Collins.....Courtney Thomas
PHOTOGRAPHER:
.....Charles Jones
ARTIST:
.....Douglass Mayberry

National Aeronautics and Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529

Official Business
Penalty for Private Use $300

BULK RATE
U.S. POSTAGE PAID
Permit No. G-27